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MULTIPLE-SPAN BRIDGE, (U)

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## FOREIGN TECHNOLOGY DIVISION



MULTIPLE-SPAN BRIDGE

By

A.I. Londarev and M.M. Mikhaylov



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## EDITED TRANSLATION

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MULTIPLE-SPAN BRIDGE

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<b>А а</b>	А, а	Р р	<b>Р р</b>	R, r
Б б	<b>Б б</b>	Б, б	С с	<b>С с</b>	S, s
В в	<b>В в</b>	V, v	Т т	<b>Т т</b>	T, t
Г г	<b>Г г</b>	G, g	Ү ү	<b>Ү ү</b>	U, u
Д д	<b>Д д</b>	D, d	Ф ф	<b>Ф ф</b>	F, f
Е е	<b>Е ё</b>	Ye, ye; E, e*	Х х	<b>Х х</b>	Kh, kh
Ж ж	<b>Ж ж</b>	Zh, zh	Ц ц	<b>Ц ц</b>	Ts, ts
З з	<b>З з</b>	Z, z	Ч ч	<b>Ч ч</b>	Ch, ch
И и	<b>И и</b>	I, i	Ш ш	<b>Ш ш</b>	Sh, sh
Й й	<b>Й и</b>	Y, y	Щ щ	<b>Щ щ</b>	Shch, shch
К к	<b>К к</b>	K, k	Ь ъ	<b>Ь ъ</b>	"
Л л	<b>Л л</b>	L, l	Ы ы	<b>Ы ы</b>	Y, y
М м	<b>М м</b>	M, m	Ь ъ	<b>Ь ъ</b>	'
Н н	<b>Н н</b>	N, n	Э э	<b>Э э</b>	E, e
О о	<b>О о</b>	O, o	Ю ю	<b>Ю ю</b>	Yu, yu
П п	<b>П п</b>	P, p	Я я	<b>Я я</b>	Ya, ya

\*ye initially, after vowels, and after ъ, ъ; е elsewhere.  
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	$\operatorname{sech}^{-1}$
cosec	csc	csch	csch	arc csch	$\operatorname{csch}^{-1}$

Russian	English
rot	curl
lg	log

## MULTIPLE-SPAN BRIDGE

Authors of the invention: A.I. Londarev and M.M. Mikhaylov

This invention refers to bridges which consist of laterally folding spans and serves for the rapid guiding of the crossing over water barriers.

Well-known is the multiple-span bridge which includes laterally folding spans with hinge-jointed sections, on each of which a casing of the pulley-block mechanism is installed, and intermediate supports. However, in the known multiple-span bridges, the design of which provides the mechanized fulfillment of operations on the installation of intermediate supports, the use of mechanisms with hydraulic drive for the transfer of the intermediate supports from the transport position to the working position and back considerably complicates the design of the bridge.

The purpose of this invention is the acceleration of the laying of the multiple-span bridge.

Figure 1 shows the multiple-span bridge, side view; Fig. 2 - casing of the pulley-blocks in cross section; Fig. 3 - diagram of the reserve of the lift and pulley-block cables; Fig. 4 - span of the bridge in the transport position; Fig. 5 - diagram of the reserve of the lift cable with installation of the bridge; Fig. 6 - the same, with the dismantling of it from the opposite shore.

The multiple-span bridge includes laterally folding spans 1 with hinge-jointed sections 2 and 3 and with an intermediate support 4. The intermediate support 4 consists of upper braces 5 and

lower braces 6, and support shoes 7 connected by a flexible rod 8 and blocks 9, 10 and 11. The lower braces 6 are equipped with toothed racks 12, which can be stopped in the housings 13 of the upper braces 5.

Mounted in the middle part of the flexible rod 8 by means of a hinge is the block 9 with the cable 14 stored in it, and the ends of the cable are passed through the blocks 10 and 11 attached to braces 5 and through blocks 15, 16 and 17 attached to the stay-block of support 4.

One of the branches of the cable 18, bending around the blocks 19 and 20, is located in section 2 of the span 1, and the other branch is located in section 3.

Casings 21 with blocks 22 and 23 are attached to both ends of the cable 18. Each of the housings of the pulley blocks, placed on sections 2 and 3 of the span, consists of axle 24, blocks 25, being bent around by the pulley-block cable 18, and a turning housing 26, which protects the coils of the cable from getting out of the grooves of the blocks.

In the bridge composition one span 1 does not have an intermediate support. Placed on each section 2 and 3 of the span near the upper collars are the casings 27 and 28 of blocks of the pulley-block, which the pulley-block cable goes around. The lift cable rests on the encircling block 29 and goes around block 22 in casing 21 of the pulley-block cable 18; the end loop of the lift cable 14 is put onto the ring-bolt button 30.

With transporting the span 1 on the bridgelayer is in a folded position, in which the casings 27 and 28 of the pulley-block units are located correspondingly above and below the axle of hinge 31. Selected here is the whole free length of the pulley-block cable 18, the casing 21 with block 22 is moved within section 2 of the span in the direction of the encircling block 20, and the lift cable 14 is pulled tight. The intermediate support 4 is folded, its lower braces 6 are slipped into the upper braces 5, and the stop shoes 7 are pressed to each other by the lower planes.

Block 23 on the second branch of the cable 18 is held by the stop device 32 in section 3 of the span 1.

The end loop 33 of cable 14 is put onto the button 34, the cable goes around block 11 on the right upper brace of the support, block 16 is on the stayblock of the support, block 9 is on the folded belt of the support spurs, blocks 14 and 16 are on the stayblock of support 4, and block 10 is on the left upper brace 5 of the support. The free loop 35 is put onto the ring-bolt button 30 in section 2 of span 1.

With the dismantling of the multiple-span bridge from the initial shore, the reserve of the lift cable 14 on blocks of the intermediate support 4 remains unchanged.

Before the dismantling of the multiple-span bridge from the opposite shore, the end loop 35 of the lift cable 14 is put onto the ring-bolt button 34, the cable goes around block 11 on the right upper brace 5 of support 4, and loop 33, taken off from the button 34, is attached into the end part of the section of the adjacent span 1.

The assembly of the bridge is carried out in the following sequence.

The bridgelayer with the span is brought up to the installation site, and here the end parts of sections 2 and 3 are directed to the side of the opposite shore. By the slope of the lift frame of the bridgelayer, the span is brought to a position close to the vertical. By the inclusion of the appropriate mechanism, the collapsing of the span and lowering of it onto the obstacle are carried out.

With the turning of section 2 relative to section 3, casings 27 and 28 of the pulley blocks are brought together, and the extension of the free branch of the pulley-block cable 18, located in section 2, occurs. The intermediate support 4 is turned under its own weight, dragging behind itself block 22 by the lift cable 14. Simultaneously with the turn of support 4 there occurs the opening up of its braces under the action of the lever-torsion mechanism, which is available near the stayblock of the support.

With further extension of the free branch of the pulley-block cable 18, there occurs movement downwards of block 9 on the flexible rod 8 for the full length of the travel of the lift cable

14, and here the lower braces 6 of support 4 are pushed out from the upper braces 5, and the support acquires maximal height.

With further lowering of the span 1 onto the obstacle, the stop shoes 7 of support 4 rest on the ground, the lower braces 6 are pushed into the braces 5 until the span occupies a horizontal position, and then the locking of the braces 6 in housings 13 of the upper braces 5 is performed.

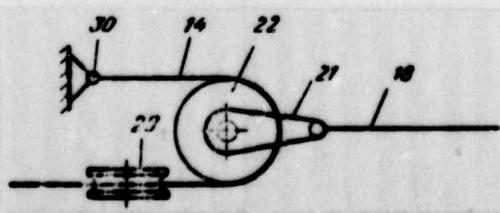
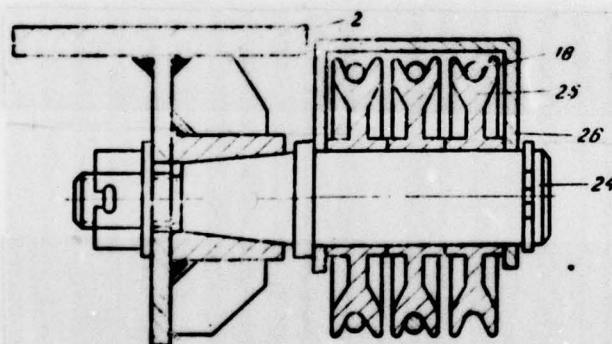
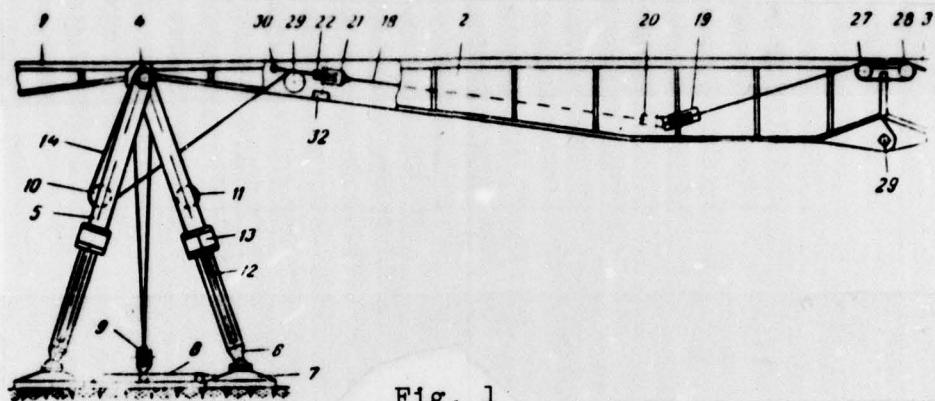
With dismantling of the bridge, the folding of the intermediate support 4 occurs owing to forces of gravity of the lowering section of the span with the support connected to it. With the turn of section 2 relative to section 3, the casings 27 and 28 of the pulley blocks depart from each other, and a shortening of the free branch of the pulley-block cable 18 occurs. Here the operation of all the mechanisms occurs in the reverse order as compared with the operation on installation of the bridge.

With dismantling of the bridge from the opposite shore, first there is removed the span located near the initial shore, for which it is disconnected from its intermediate support and is laid on the bridgelayer without the support, and the support is connected to the adjacent span 1. Here the end loop 35 of the lift cable 14 of this support is put onto the button 34, the cable is bent around the block 10 on the left upper brace 5 of support 4, and the loop 33, taken from button 34, is fastened in the end part of the section of the adjacent span. After this the block 23 of the pulley-block cable 18, locked earlier in section 3 of the span, is unfastened, and the earlier free block 22 of this cable is fastened in section 2 of the span.

#### Object of the invention

The object of the invention is a multiple-span bridge which includes latterally folding spans with hinge-connected sections, on each of which a casing of the pulley-block mechanism is installed, and intermediate supports, which is distinguished by the fact that for the purpose of accelerating its erection, on the end of one of the sections of the span there is hinged fastened a support made with braces adjustable in height, which have on the free end stop shoes connected by means of a flexible rod, in the

middle part of which mounted by means of a hinge is a block with a cable stored in it; the ends of the cable are passed through the blocks attached to the braces of the support and are connected with the pulley-block mechanism.



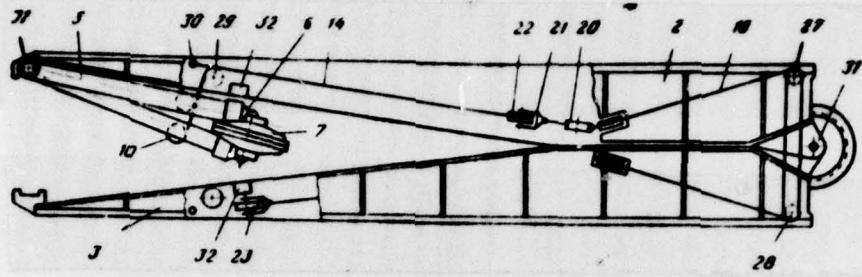


Fig. 4

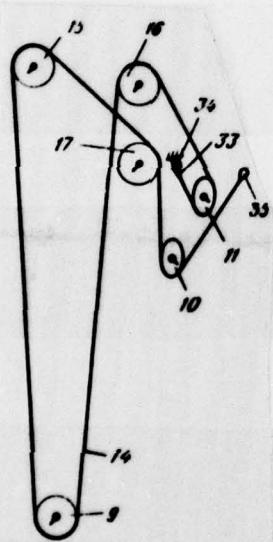


Fig. 5

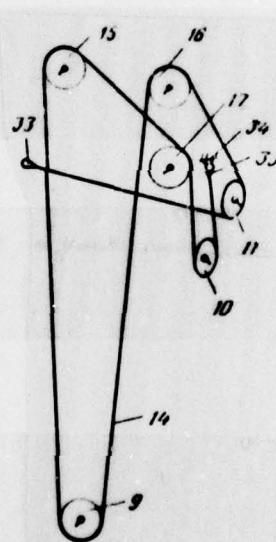


Fig. 6

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